PUBLICATION NUMBER : 2000079819
PUBLICATION DATE : 21-03-00

APPLICATION DATE : 31-07-98
APPLICATION NUMBER : 10217575

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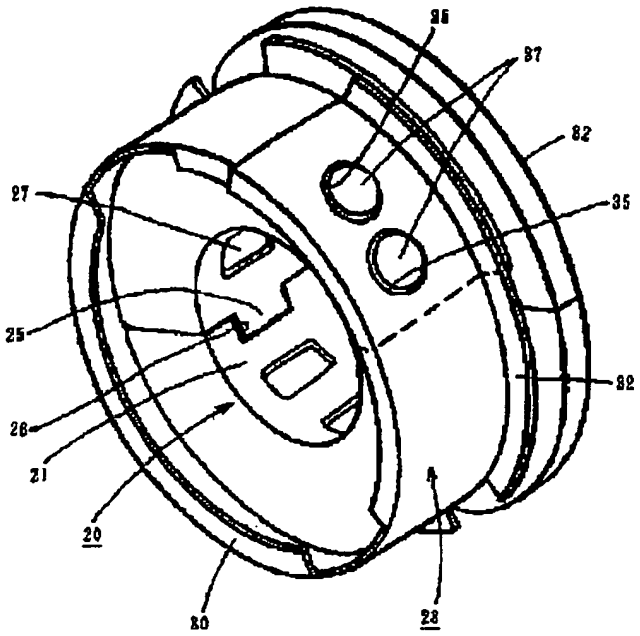
INT.CL. : B60G 21/055

TITLE : LATERAL SLIPPAGE PREVENTIVE DEVICE FOR STABILIZER



ABSTRACT : PROBLEM TO BE SOLVED: To provide a lateral slippage preventive device for a stabilizer, which can be easily mounted to any stabilizer regardless of its shape, and can be firmly fastened thereto.

SOLUTION: This device is provided with an inner wheel body 20 which is formed out of high polymer material, has its outer circumferential surface tapered in the axial direction, is divided in the circumferential direction, and has itself enclosed a place close to the pivot position of a stabilizer base part, and with an outer wheel body 28 formed out of a metallic sheet having an inner circumferential surface tapered in the axial direction with a same gradient with the outer circumferential surface of the inner wheel body 20, and an end part of a circumference divided in the circumferential direction to be relatively combined with the outer circumferential surface of the inner wheel body 20 to be firmly fitted.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
F16B 43/00, F16D 1/068, B23K 101/00

A1

(11) International Publication Number: WO 97/37142

(43) International Publication Date: 9 October 1997 (09.10.97)

(21) International Application Number: PCT/US97/03945

(22) International Filing Date: 13 March 1997 (13.03.97)

(30) Priority Data:
08/624,993 29 March 1996 (29.03.96) US

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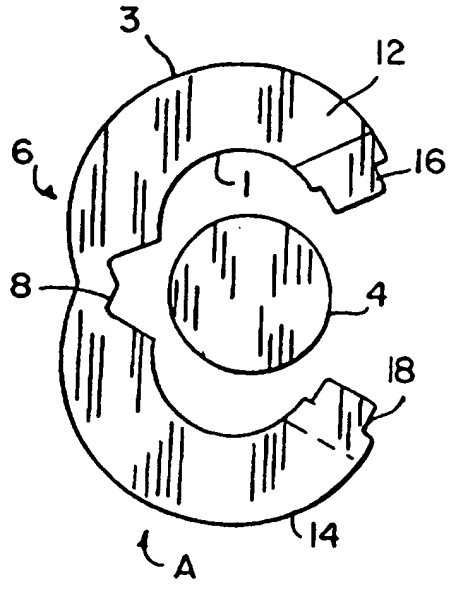
(81) Designated States: AU, BR, CA, CN, JP, KR, MX, RU, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
With amended claims.

(54) Title: ANNULAR SHAFT FLANGE

(57) Abstract

An annular flange (6) which can be positioned on a shaft (4) and securely welded (10) in place. This disclosure also contemplates the method of making an annular shaft flange (6). This novel flange (6) is materially stronger than the prior art and has lower production costs.



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ANNULAR SHAFT FLANGE

Background of the Invention

This invention relates to an annular flange which can be positioned on a shaft and fixed in place. The flange functions as a stop to locate a shaft at a particular distance in a hole or to retain an object in a position on a shaft.

Previous devices, such as snap rings, cotter pins or split pins require the shaft to be machined or drilled, weakening the shaft and adding cost. A locking ring requires no machining, but has a greater cost penalty and can only be placed on the shaft if the diameter of the shaft is constant or has a diameter reduction.

This novel annular flange has numerous advantages over the prior art. The present invention is materially stronger than the prior art snap rings, cotter rings, or split pins and requires no machinery drilling and thus does not weaken the shaft and reduces cost.

This novel shaft flange is also stronger than the prior art. The prior art roughly withstands approximately 400 lbs. of pressure while the present invention withstands approximately 1,200 lbs. of pressure. (See Chart 1.) It also exceeds present methods push-out force by a multiple of two.

The present invention is also easier to assemble, easier to manufacture, has approximately one half lower production costs than the prior art and is only 20% of the weight of the prior art.

This annular flange can be installed at the shaft manufacturing before painting adding yet another advantage over the prior art. Additionally, this flange can encircle the shaft at *any* point along the shaft unlike the prior art which must be slid over a free shaft end and slid down the circumference of the shaft to the point the flange is to be permanently affixed to the shaft. This trait of the present invention provides much flexibility and wider applications for its use.

This novel annular flange can be used in a myriad of industries such as automotive, lawn and garden, military equipment and machine tools. This device would be useful in any application where there exists a requirement to have two mating parts slide together and stop at a predetermined distance.

CHART 1

O.D.	Shaft Dia. (Inch)	Flange I.D. (Inch)	Flange Thickness (Inch)	Push Out Force (lb's.)
1.500	.745	*	.130	1,000 lbs.
1.500	.770	*	.130	1,250 lbs.
1.040	.706	*	.130	300 lbs.
1.040	.716	*	.130	500 lbs.

*Flange I.D. (Inch) -- to be determined by shaft diameter.

Summary of the Invention

This invention is a stamped ring, or washer, with modifications performed during the stamping process. The washer has a passage of material removed from the outside diameter to the inside diameter. At 180°, a similar channel is removed from the inside diameter stopping short of the outside diameter. The passage is now spread apart to a distance greater than the original inside diameter. On the edges of the passage, two areas are coined reducing the thickness of the washer and extruding material into the gap to a distance greater than half of the original passage width. The ring has now taken the form of a letter "C", being held together by the web of material at the junction of the opposing channel nearing the outer diameter.

This device could alternately be made from two identical halves; the coined areas would now be placed at 180° on a half, with the coined sections made in such a way that a stamped half would have the coined areas nesting when joined together with an identical stamping rotated through 180°. Both sides could then be welded together.

Brief Description of the Drawings

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

Fig. 1 is a perspective of the flange in a closed position around a shaft;

Fig. 2 is a top view of the flange alone in the partially open position;

Fig. 3 is a top view of the flange alone in the closed position;

Fig. 4 is a side view of the flange in a closed position around a shaft;

Fig. 5 is a top view of a second embodiment of the flange in an open position;

Fig. 6 is a detailed side view of this invention; and

Fig. 7 is a top view of the first embodiment of this invention in a fully open position around a shaft.

Detailed Description of the Preferred Embodiment

The annular flange ring of the present invention can be made from any ferrous, non-ferrous or any plastic material that is capable of being welded. This flange could be constructed from the aforementioned in pure element form, or in compound form or as a mixture.

In the preferred embodiment, the subject invention assembly process to the shaft is illustrated in Fig. 1. The annular flange **6** is produced in a progressive die and will be manufactured in the open position A as seen in Fig. 7. The flange **6** can be fed automatically over the shaft 4 at the predetermined position. The invention will then be mechanically closed (to closed position B) as shown in Fig.3, around shaft **4** and positioned to be welded with a resistance-type spot welder. The size (KVA rating) of the welder and the electrode design would depend upon the thickness of the annular flange **6**. During the weld cycle, pressure is applied mechanically to the outer diameter **3** of the annular flange **6** and maintained for period to allow the weld to solidify. The pressure would then be released, thus completing the assembly cycle.

Fig. 1 shows the annular flange **6** in the closed position B about a shaft **4**. Fig. 1 also displays the hinge channel **8** and width **9**.

Fig. 2 illustrates the flange **6** in a partially open position A facilitated by hinge channel **8** (Fig. 7 illustrates the fully open position A'). Fig. 2 is illustrated without the shaft **4** and is a top view of the flange **6**. Also illustrated is first arc **12** and second arc **14** as well as nesting area **10**. Also shown in Fig. 2 is inner diameter **1** and outer diameter **3**.

Fig. 3 illustrates flange **6** in a closed position B around shaft **4**. Once flange 6 is closed, it can be permanently kept closed by spot welding nesting area **10**.

Fig. 4 is a side view illustrating flange **6** around shaft **4**. Width **9** is also shown. By viewing Figures 1-4 one can see that first arc **12** has at one end a first arc nest end **16**. At the opposing end of first arc **12** is hinge channel **8**. Second arc **14**

has on one end the second arc nest end **18** and on the opposing end hinge channel **8**, which constitutes the only point of attachment between first arc **12** and second arc **14** in partial open position A and fully open position A'.

In the closed position B, first arc nest end **16** is designed to mate with the second arc nest end **18** wherein first arc nest end **16** and second arc nest end **18** can be spot welded to hold the flange **6** in closed position B around shaft 4 permanently.

Fig. 5 illustrates a second embodiment of this invention wherein instead of hinge channel **8** there exists a second nesting area **10'**. The first arc **12** and second arc **14** are "C" shaped members. The second nesting area **10'** is similar to nesting area **10**. First arc **12** has, in this embodiment, a first arc nest end **16** and a first arc second nest end **16'**. Second arc **14** likewise has a second arc nest end **18** and a second arc second nest end **18'**. The first arc nest end **16** is proportioned similar to the first embodiment to mate with second arc nest end **18**. Likewise, first arc second nest end **16'** is proportioned to mateably rest with second arc second nest end **18'**. Subsequently, nesting area **10** and second nesting area **10'** can be welded securing the flange **6** about shaft **4**. Also shown in Fig. 5 are inner diameter **1** and outer diameter **3**.

Fig. 6 illustrates a detail side view of the nesting end **10** (and is similar to **10'**) where it is seen that the first arc nest end **16** has a lip **20** which fits into the recess **22** of second arc nest end **18**. Second arc nest end **18** also has a lip **20(a)** which likewise rests in recess **22(a)** of first arc nest end **16**.

Preferably, recess **22** and recess **22(a)** are one half or less of width **9**. Likewise, lip **20** and **20(a)** are at least one half or greater of width **9**.

Fig. 7 illustrates the fully open position A' of flange **6** around shaft **4**.

"Open position" is defined within the scope of this invention as partial open position A and fully open position A'.

I claim:

1. An annular shaft device comprising:

a flange having a first arc and a second arc wherein said first arc and said second arc each have an inner diameter and an outer diameter and are solely joined by a hinge channel when said flange is in an open position wherein said flange resembles the letter "C" in said open position;

wherein said first arc and said second arc have a nesting area wherein said nesting area is located approximately 180° from said hinge channel;

said nesting area is comprised of one nest end located on said first arc and a second nest end located on said second arc.

2. The annular device of claim 1 wherein each said nest end is comprised of a recess and a lip wherein said recess and said lip of said first nest end mateably joins said lip and said recess, respectively, of said second nest end when said flange is in a closed position wherein said flange is roughly circular in shape when said flange is in said closed position.

3. The annular device of claim 1 wherein a shaft is located in said inner diameter and said flange is in said closed position.

4. The annular device of claim 2 wherein said hinge channel comprises a notch extending from said inner diameter of said first arc and said second arc toward the outer diameter of said first arc and said second arc.

5. The annular device of claim 4 wherein said lip of said first arc comprises at least one half the width of said first arc and said lip of said second arc comprises at least one half the width of said second arc.

6. The annular device of claim 5 wherein said recess of said first arc is comprised of at most one half the diameter of the width of said first arc and said recess of said second arc comprises at most one half the width of said second arc.

7. The annular device of claim 1 wherein said flange is comprised of at least one substance from the group consisting of:

a non-ferrous substance, a ferrous substance or a plastic material.

8. The annular device of claim 7 wherein said substance is in compound form.

9. The annular device of claim 7 wherein said substance is in elemental form.

10. The annular device of claim 7 wherein said substance is in the form of a mixture.

11. An annular shaft flange comprising:

two "C" shaped members wherein each said member has two nesting ends wherein said nesting ends of one member mateably join said nesting ends of said other member when each member is positioned so that the two members together approximately form a circular shape wherein said circular shape has an inner diameter and an outer diameter.

12. The annular flange of claim 11 wherein a shaft is located in said inner diameter and said flange is in said closed position.

13. The annular flange of claim 11 wherein each of said nesting ends has a lip and a recess wherein said lip of one member mateably joins with said recess of said other member.

14. The annular flange of claim 13 wherein each said lip is at least one half the width of the flange.

15. The annular flange of claim 14 wherein each said recess is at most one half the diameter of the width of said flange.

16. The annular flange of claim 11 wherein said flange is comprised of at least one substance of the group consisting of: a non-ferrous substance, a ferrous substance, or a plastic material.

17. The annular flange of claim 16 wherein said substance is in compound form.

18. The annular flange of claim 16 wherein said substance is in elemental form.

19. The annular flange of claim 16 wherein said substance is in the form of a mixture.

20. A method of manufacturing an annular shaft flange and adhering said flange to a shaft comprising:

manufacturing an annular flange in a progressive die in an open position wherein said open position results in the annular flange being shaped like the letter "C";

placing said flange over a shaft to a predetermined position;

mechanically closing said flange so that it is no longer in a "C" position but in approximately an "O" position;

welding said annular flange closed permanently onto said shaft.

21. A method of manufacturing an annular shaft flange comprising:

utiizing a standard washer and removing a passage of material from said washer's outside diameter to said washer's inside diameter;

boring a similar channel at 180° from said passage, said channel being removed from said inside diameter stopping short of said outside diameter;

reducing the thickness of the edges of said passage to a distance of approximately no less than half of the original passage width;

opening said flange so that each of the opposing edges of said passage become more distant from each other thereby allowing a shaft to fit through said passage;

closing said flange so that said passage edges meet;

welding said edges of said passage together so that the flange is secured to said shaft.

AMENDED CLAIMS

[received by the International Bureau on 31 July 1997 (31.07.97); original claims 1 and 11 amended; remaining claims unchanged (4 pages)]

1. An annular shaft device comprising:

a one piece flange constructed of a parent material, said flange having a first arc and a second arc wherein said first arc and said second arc each have an inner diameter and an outer diameter and are solely joined by a hinge channel allowing resiliency so that when said flange is in an open position said flange resembles the letter "C" and is generally circular in a closed position:

wherein said first arc and said second arc have a nesting area wherein said nesting area is located approximately 180° from said hinge channel:

said nesting area is comprised of a first nest end located on said first arc and a second nest end located on said second arc:

said nest end is comprised of a recess and a lip wherein said recess and said lip of said first nest end mateably joins said lip and said recess, respectively, of said second nest end when said flange is in a closed position:

said lip of said first arc comprises at least one half the width of said first arc and said lip of said second arc comprises at least one half the width of second arc:

said recess of said first arc is comprised of at most one half the width of said first arc and said recess of said second arc comprises at most one half the width of said second arc:

wherein when said first nest end mateably joins in an overlapping manner with said second nest end, they form a nesting area sufficient to accommodate spot weldable connection wherein said connection is adapted to be constructed of said parent material.

2. The annular device of claim 1 wherein each said nest end is comprised of a recess and a lip wherein said recess and said lip of said first nest end mateably joins said lip and said recess, respectively, of said second nest end when said flange is in a closed position wherein said flange is roughly circular in shape when said flange is in said closed position.

3. The annular device of claim 1 wherein a shaft is located in said inner diameter and said flange is in said closed position.

4. The annular device of claim 2 wherein said hinge channel comprises a notch extending from said inner diameter of said first arc and said second arc toward the outer diameter of said first arc and said second arc.

5. The annular device of claim 4 wherein said lip of said first arc comprises at least one half the width of said first arc and said lip of said second arc comprises at least one half the width of said second arc.

6. The annular device of claim 5 wherein said recess of said first arc is comprised of at most one half the diameter of the width of said first arc and said recess of said second arc comprises at most one half the width of said second arc.

7. The annular device of claim 1 wherein said flange is comprised of at least one substance from the group consisting of:

a non-ferrous substance, a ferrous substance or a plastic material.

8. The annular device of claim 7 wherein said substance is in compound form.

9. The annular device of claim 7 wherein said substance is in elemental form.

10. The annular device of claim 7 wherein said substance is in the form of a mixture.

11. An annular shaft flange comprising:

two "C" shaped members constructed of a parent material wherein each said member has two nesting ends wherein said nesting ends of one member mateably join said nesting ends of said other member when each member is positioned so that the two members together approximately form a circular shape wherein said circular shape has an inner diameter and an outer diameter;

wherein each of said nesting ends has a lip and a recess wherein said lip of one member mateably joins with said recess of said other member;

wherein each said lip is at least one half the width of said flange and wherein each said recess is at most one half the width of said flange;

wherein said nesting ends are adapted to mateably join in an overlapping manner to provide sufficient area for a spot weldable connection constructed of said parent material.

12. The annular flange of claim 11 wherein a shaft is located in said inner diameter and said flange is in said closed position.

13. The annular flange of claim 11 wherein each of said nesting ends has a lip and a recess wherein said lip of one member mateably joins with said recess of said other member.

14. The annular flange of claim 13 wherein each said lip is at least one half the width of the flange.

15. The annular flange of claim 14 wherein each said recess is at most one half the diameter of the width of said flange.

16. The annular flange of claim 11 wherein said flange is comprised of at least one substance of the group consisting of: a non-ferrous substance, a ferrous substance, or a plastic material.

17. The annular flange of claim 16 wherein said substance is in compound form.

18. The annular flange of claim 16 wherein said substance is in elemental form.

19. The annular flange of claim 16 wherein said substance is in the form of a mixture.

20. A method of manufacturing an annular shaft flange and adhering said flange to a shaft comprising:

manufacturing an annular flange in a progressive die in an open position wherein said open position results in the annular flange being shaped like the letter "C";

placing said flange over a shaft to a predetermined position;

mechanically closing said flange so that it is no longer in a "C" position but in approximately an "O" position;

welding said annular flange closed permanently onto said shaft.

21. A method of manufacturing an annular shaft flange comprising:

utiizing a standard washer and removing a passage of material from said washer's outside diameter to said washer's inside diameter;

boring a similar channel at 180° from said passage, said channel being removed from said inside diameter stopping short of said outside diameter;

reducing the thickness of the edges of said passage to a distance of approximately no less than half of the original passage width:

opening said flange so that each of the opposing edges of said passage become more distant from each other thereby allowing a shaft to fit through said passage;

closing said flange so that said passage edges meet;

welding said edges of said passage together so that the flange is secured to said shaft.

FIG. 1

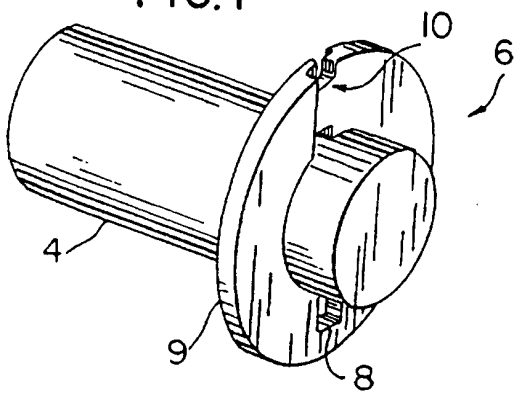


FIG. 2

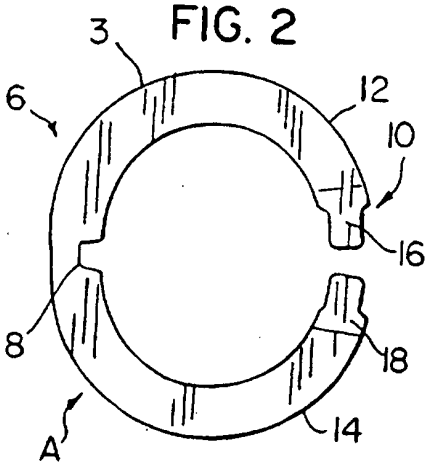


FIG. 3

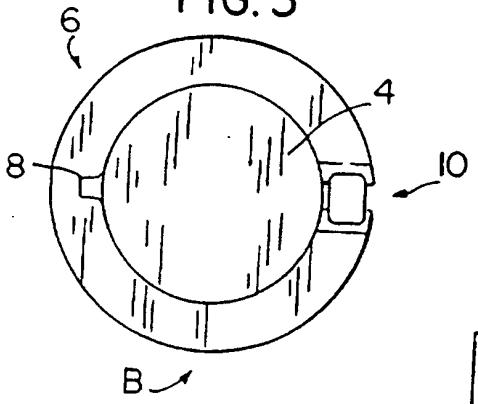


FIG. 4

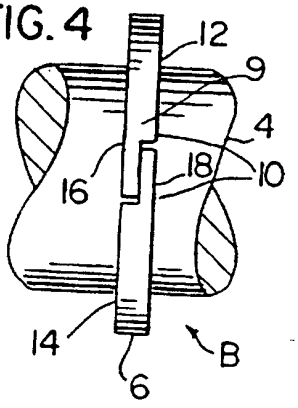


FIG. 6

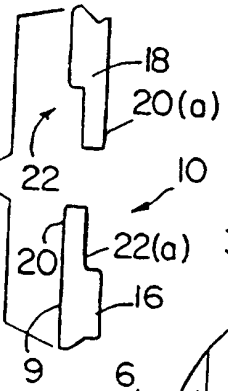


FIG. 5

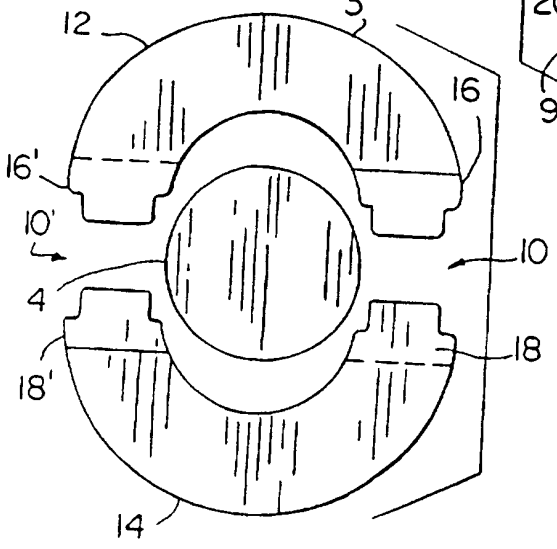
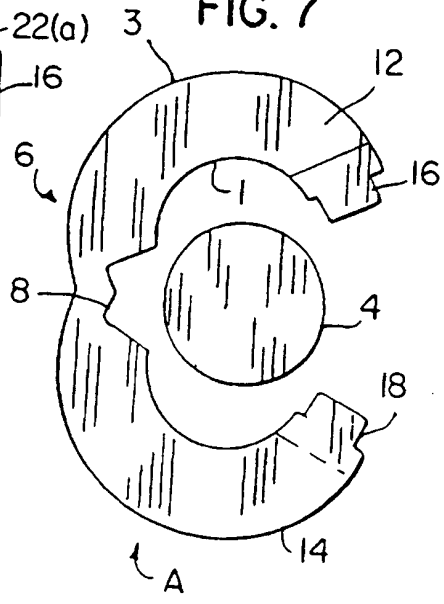


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03945

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :F16B 43/00; F16D 1/068; B23K 101:00
US CL :403/270
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 403/270, 344, 271, 263, 261, 327, Dig. 7; 411/517, 353; 29/401.1, 557, 558, Dig. 48, 897; 285/416, 415, 405, 321

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 4,116,572 A (HELDMANN ET AL.) 26 September 1978 (26/09/78), Fig. 1, col. 2, lines 47-65.	1, 3, 7-10 ---------- 2, 4-6, 16-19, 21
Y	US 5,085,535 A (SOLBERG ET AL.) 04 February 1992 (04/02/92), col. 4, lines 53-68 and col. 5, lines 1-4.	2, 4-6
X ------ Y	Truarc Brochure, "Interlocking Retaining Rings", published by Waldes Kohinoor, Inc., June 1965.	11-15 --------- 16-19
X	JP, 55-120439 A (SHIYUNJI NEMOTO) 16 September 1980, (16/09/80), Figs. 1-4, abstract.	20

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
06 MAY 1997	06 JUN 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer ANTHONY KNIGHT Telephone No. (703) 308-2168

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/03945

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X --- Y	US 4,428,697 A (RULAND) 31 January 1984 (31/01/84), Fig. 1.	1, 3, 7-10 --- 21
Y	US 2,025,555 A (STAHL) 24 December 1935 (24/12/35), Figs. 1, 2, 7, page 2, col. 1, lines 42-47.	21
X, P	US 5,509,864 A (HAUSER) 23 April 1996 (23/04/96), Fig. 1.	1-10
X	US 1,780,003 A (CHANCE) 28 October 1930 (28/10/30), Fig. 1.	1-3, 7-10
X	US 1,700,319 A (KJEKSTAD) 29 January 1929 (29/01/29), Fig. 1.	20
X	US 2,656,594 A (WESTLING) 27 October 1953 (27/10/53), Fig. 3, col. 2, lines 25-35.	20
A	US 2,697,274 A (MERRILL) 21 December 1954 (21/12/54), col. 2, lines 38-43.	20